

May 31, 2019

Jacobs Project No: D3165200

Mr. Jeff Harenda
City of Waukesha
Department of Public Works
130 Delafield Street
Waukesha, WI 53188

Subject: Return Flow Pump Station, Advanced Phosphorus Treatment and Facilities
Enhancement – Amendment No. 1

Dear Mr. Harenda:

Jacobs was authorized by the City of Waukesha by Contract executed by Jacobs and Purchase Order No. 190015-00 (Jacobs Project No: D3165200) to provide engineering services including preliminary and final design for a Return Flow Pump Station (RFPS), enhanced phosphorus treatment and facilities enhancements at the Clean Water Plant (CWP). Purchase order 190015-00 was issued for engineering services to be completed in 2019 and was issued for \$719,745. Total contract value is \$1,536,854.

As the preliminary design has progressed, there have determined to be the need for engineering services not anticipated when the contract was developed and executed. This letter summarizes the additional tasks and associated fees. These services are summarized below.

1. It was agreed between the City and Jacobs that computational fluid dynamics (CFD) modeling should be performed to size and configure the pump station wet well. Proper sizing of the wet wells is critical to the operation and longevity of the pumps. For example, proper wet well design will minimize pump vibration and extend the pump life. The CFD modeling results will be referenced in the pump specification to help demonstrate to the pump vendors that the wet wells have been design properly which will result in the pumps performing as intended. Impacted disciplines include:
 - 1.1. Process-mechanical to perform CFD modeling.
 - 1.2. Process-mechanical and structural to design details of the wetwell and pump cans based on modeling results.
2. CWP requested the addition of four electric actuated valves in the Preliminary Treatment Building (Building 110) to allow the gates to be opened and closed quickly and easily. The actuators will be utilized to operate four slide gates already planned to be replaced as part of this project. Impacted disciplines include:
 - 2.1. Process-mechanical to work with manufacturer to size the actuator and specify the actuators.
 - 2.2. Electrical to provide power to the actuators and modify one-line diagram.
 - 2.3. Instrumentation to provide control to actuators.
3. The Return Flow Pump Station will pump final effluent through the 23-mile pipeline to an outfall in the City of Franklin. Greeley and Hansen (G&H) designed the pipeline and was responsible for

performing a transient/surge analysis to determine what mitigation is required to prevent surge and the associated pump damage. Jacobs scope included a task to review the G&H transient/surge analysis. The review resulted in a recommendation to provide a surge tank to minimize water hammer pressure waves and possible damage to the pumps and piping system. This recommendation also minimizes the cost and number of critical combination air relief valves needed on the pipeline. The surge tank system will be located inside the Return Flow Pump Station. The building must be made larger to accommodate the surge protection system which includes a tank, piping connections, air compressor, air receiver and controls. The addition of the surge system caused the size of the pump station building footprint to increase by about 45 percent. Design of the surge tank system was not in the original scope of work. The impacted disciplines are:

- 3.1. Process-mechanical to layout the system, provide piping to from tanks and compressors and specify the surge tank and compressors.
 - 3.2. Structural to design and detail surge tank supports and building expansion.
 - 3.3. Architecture to design the building expansion
 - 3.4. Electrical to provide power and updating one-line.
 - 3.5. Instrumentation to develop a new P&ID, specify additional instruments and develop control logic descriptions.
 - 3.6. Plumbing to provide hub drains for compressors.
4. The Jacobs scope of work included the replacement of five dry-pit effluent pumps. The new pumps have a different configuration than the existing pumps and the concrete pedestals for the pumps will need to be replaced with new larger pedestals. The replacement of the pedestal was not in the original scope. Impacted disciplines include:
- 4.1. Process-mechanical to provide pump details to structural.
 - 4.2. Structural to design pump pedestal.

In addition to the extra effort required for design for the above items, additional effort will be required for services during construction (SDC). For example, the surge system equipment and gates will have shop drawings that will be required to be reviewed. And there will be some additional effort associated with most or all SDC tasks such as field orders, request for information, etc.

The total fees for Amendment No. 1 are \$122,971. The breakdown of the level of effort and associated fees are shown in the attachment. If you have any questions regarding the information presented above, please call me at (414) 847-0313.

Sincerely,

Jacobs



Bill Desing, P.E.
Project Manager



Rajeev Srivastava, PhD, Manager of Projects

cc. Andrew Schrank, P.E.